

REMARKS

Claims 1-4, 7-9, 11-16, 18-21, 24-25, 27-28, and 30-39 are pending in the application.

Claims 1-4, 7-9, 11-16, 18-21, 24-25, 27-28, and 30-39 stand rejected. Claims 1, 24, and 38 are independent claims.

Claim 1 stands rejected under 35 U.S.C. §102(b) as allegedly being anticipated by Tomioka *et al.* (U.S. 5,897,713) (Tomioka).

Claim 1 recites, *inter alia*, “an RF antenna unit including an active antenna and a parasitic antenna, … the parasitic antenna surrounding the plasma chamber, wherein the parasitic antenna is not electrically coupled to the RF source; and … wherein each antenna of the RF antenna unit resonates RF current and induces electro-magnetic field that is effective to pass into the plasma chamber and that excites and ionizes the process gas to generate a plasma within the plasma chamber, the plasma comprising ions.”

As noted in the claim, the RF antenna unit comprises a parasitic antenna that is not electrically coupled to the RF source and that resonates RF current and induces electro-magnetic field that is effective to pass into the plasma chamber and that excites and ionizes the process gas to generate a plasma within the plasma chamber, the plasma comprising ions.

According to the United States Court of Appeals for the Federal Circuit, a claim is anticipated only if a single prior art reference set forth each and every feature recited in the claim (*Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987)). Anticipation may still exist even if the prior art reference does not expressly set forth each and every feature under the doctrine of inherency (see *Continental Can Co. USA v. Monsanto Co.*, 948 F.2d 1264, 201USPQ2d 1746, 1749-50 (Fed. Cir 1991)). However, the missing feature must be necessarily present in the feature (id.). “Inherency [] may not be established by probabilities

or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient” (*In re Oelrich*, 666 F.2d 578, 581, 212 USPQ 323, 326 (C.C.P.A. 1981)). Moreover, if the rejection is based on inherency, “it is incumbent on the [Patent Office] to point to the ‘page and line’ of the prior art which justifies an inherency theory” (*Ex parte Schricker*, 56 USPQ2d 1723 (B.P.A.I. 2000) (unpublished)).

In the present Office Action, the Patent Office indicates that Tomioka discloses an RF antenna unit that includes an active antenna (55a-55b) (page 2, lines 17-20). Pointing to antenna 55a and 55d, the Patent Office indicates that Tomioka also discloses a parasitic antenna (id.).

Applicants respectfully submit that Tomioka does not disclose a parasitic antenna recited in claim 1. Tomioka, as read by Applicants, discloses a plasma generating apparatus. However, nowhere in Tomioka is there a parasitic antenna recited in claim 1. Referring to FIG. 8, Tomioka discloses a plasma generating apparatus comprising coils 55a and 55b. As shown in FIG. 8, coil 55a is electrically coupled to RF power supply or amplifier 57a, whereas coil 55b is electrically coupled to RF power supply or amplifier 57b. Referring to FIG 10, Tomioka discloses another plasma generating apparatus comprising coils 55a-55e. Similar to coils 55a and 55b shown in FIG. 8, coil 55a is electrically coupled to RF power supply or amplifier 57a and coil 55b is electrically coupled to RF power supply or amplifier 57b. Coil 55c, meanwhile, is electrically coupled to RF power supply or amplifier 57c. Referring to FIG. 12, Tomioka discloses another plasma generating apparatus comprising coils 55a-55d. As shown in the figure, coil 55a is electrically coupled to RF power supply or amplifier 57a; meanwhile, coil 55b is electrically coupled to RF power supply or amplifier 57b. Tomioka also discloses that coil 55c is electrically coupled to RF power supply or amplifier 57c, and coil 55d is electrically coupled to RF power supply or amplifier 57d. Referring to FIG. 13, Tomioka discloses yet another plasma generating apparatus comprising coils 55a and 55b. As shown

in the figure, coil 55a is electrically coupled to RF power supply or amplifier 57a, whereas coil 55b is electrically coupled RF power supply or amplifier 57b.

Accordingly, each of coils 55a-55d contained in the plasma generating apparatus shown in FIGs. 8, 10, 12, and 13 of Tomioka is electrically coupled to RF power source or amplifier. None of coils 55a-55d is a parasitic antenna that is not electrically coupled to RF source and that resonates RF current and induces electro-magnetic field that is effective to pass into the plasma chamber and that excites and ionizes the process gas to generate a plasma within the plasma chamber, the plasma comprising ions. As such, Tomioka does not set forth “an RF antenna unit including an active antenna and a parasitic antenna, . . . the parasitic antenna surrounding the plasma chamber, wherein the parasitic antenna is not electrically coupled to the RF source; and . . . wherein each antenna of the RF antenna unit resonates RF current and induces electro-magnetic field that is effective to pass into the plasma chamber and that excites and ionizes the process gas to generate a plasma within the plasma chamber, the plasma comprising ions,” as recited in claim 1, and Tomioka does not anticipate claim 1.

Applicants respectfully request withdrawal of the rejection.

Claim 38 stands rejected under 35 U.S.C. §102(b) as allegedly being anticipated by Tomioka.

Claim 38 recites “an RF antenna unit including a horizontally-extending active antenna coil and a vertically extending parasitic antenna coil, the horizontally-extending active antenna coil that includes a first end coupled to the RF source to receive the RF current from the RF source, the vertically-extending parasitic antenna coil being without an electrical connection to a power source . . . wherein the vertically-extending parasitic antenna coil induces an RF current into the plasma chamber and excites and ionizes a process gas so as to generate a plasma in the plasma chamber, the plasma comprising ions.”

As noted above, Tomioka discloses a plasma generating apparatus comprising a plurality of coils 55a-55d. However, each of the coils 55a-55d is electrically coupled to RF power supply or amplifier 57a-57d. None of coil 55a-55d is a parasitic antenna that is not electrically coupled to RF source and that induces an RF current into the plasma chamber and excites and ionizes a process gas so as to generate a plasma in the plasma chamber, the plasma comprising ions. As such, Tomioka does not set forth “an RF antenna unit including a horizontally-extending active antenna coil and a vertically extending parasitic antenna coil, the horizontally-extending active antenna coil that includes a first end coupled to the RF source to receive the RF current from the RF source, the vertically-extending parasitic antenna coil being without an electrical connection to a power source... wherein the vertically-extending parasitic antenna coil induces an RF current into the plasma chamber and excites and ionizes a process gas so as to generate a plasma in the plasma chamber, the plasma comprising ions,” as recited in claim 38, and Tomioka does not anticipate claim 38.

Applicants respectfully request withdrawal of the rejection.

Claim 24 stands rejected under 35 U.S.C. §103(a) as allegedly being obvious over Tomioka in view of Trow *et al.* (U.S. 5,824,607) (“Trow”) or Collins *et al.* (U.S. 5,556,501) (“Collins”).

Claim 24 recites, *inter alia*, “a radio frequency antenna unit including a horizontally-extending coil... and a vertically-extending coil disposed on the vertical cylindrical dielectric section..., wherein... one of the horizontally-extending coil and the vertically-extending coil comprises a parasitic antenna that is not electrically coupled to the RF source... [and] the parasitic antenna of the radio frequency antenna unit inducing radio frequency current into the plasma chamber that excites and ionizes a process gas so as to generate a plasma in the plasma chamber.”

As noted in section 2143(A) of the Manual for Patent Examining Procedure (“MPEP”), a rejection of a claim as obvious cannot be sustained unless the Patent Office establishes that one or more references teach all features recited in the claim, “with the only difference between the [feature] and [one or more references] being lack of actual combination of the [feature] in a single [] reference.”

In rejecting claim 24, the Patent Office indicates that one of the coils 55a-55d disclosed is the parasitic antenna recited in claim 24 (present Office Action, page 9, lines 1-14).

As noted earlier, nowhere in Tomioka discloses a parasitic antenna that is not electrically coupled to RF source and that induces radio frequency current into the plasma chamber that excites and ionizes a process gas so as to generate a plasma in the plasma chamber. Accordingly, Tomioka does not disclose “a radio frequency antenna unit including a horizontally-extending coil... and a vertically-extending coil disposed on the vertical cylindrical dielectric section..., wherein... one of the horizontally-extending coil and the vertically-extending coil comprises a parasitic antenna that is not electrically coupled to the RF source... [and] the parasitic antenna of the radio frequency antenna unit inducing radio frequency current into the plasma chamber that excites and ionizes a process gas so as to generate a plasma in the plasma chamber,” as recited in claim 24. As Tomioka fails to disclose the parasitic antenna recited in claim 24, claim 24 is not obvious over a combination of Tomioka and Trow or a combination of Tomioka and Collins unless each of Trow and Collins disclose the parasitic antenna of claim 24 and remedies the deficiencies of Tomioka.

Trow, as read by Applicants, discloses an inductively coupled plasma reactor. According to Trow, the plasma reactor comprises “an inductive antenna coil 30 which is powered by an RF supply and matching network 31” (Trow, column 4, line 4-8). As such, Trow does not disclose or teach “a radio frequency antenna unit including a horizontally-extending coil... and a vertically-extending

coil disposed on the vertical cylindrical dielectric section..., wherein... one of the horizontally-extending coil and the vertically-extending coil comprises a parasitic antenna that is not electrically coupled to the RF source... [and] the parasitic antenna of the radio frequency antenna unit inducing radio frequency current into the plasma chamber that excites and ionizes a process gas so as to generate a plasma in the plasma chamber,” as recited in claim 24.

Collins, as read by Applicants, discloses a silicon scavenger in an inductively coupled RF plasma reactor. As illustrated in FIG. 1-3, the reactor comprises a cylindrical wall 17W of dielectric such as quartz and a cover or top 17T typically aluminum or anodized aluminum (Collins, column 7, line 33-39). In addition, the reactor comprises an antenna 30, preferably having a multiple turn cylindrical configuration, coupled to an RF supply via a matching network 31. However, nowhere in Collins is there a disclosure of a parasitic antenna that is not electrically coupled to RF source and that induces radio frequency current into the plasma chamber that excites and ionizes a process gas so as to generate a plasma in the plasma chamber. Accordingly, Collins also fails to disclose or teach “a radio frequency antenna unit including a horizontally-extending coil... and a vertically-extending coil disposed on the vertical cylindrical dielectric section..., wherein... one of the horizontally-extending coil and the vertically-extending coil comprises a parasitic antenna that is not electrically coupled to the RF source... [and] the parasitic antenna of the radio frequency antenna unit inducing radio frequency current into the plasma chamber that excites and ionizes a process gas so as to generate a plasma in the plasma chamber,” as recited in claim 24.

As none of Tomioka, Trow, and Collins discloses the parasitic antenna of claim 24, the combination of Tomioka and Trow, the combination of Tomioka and Collins, or the combination of Tomioka, Trow, and Collins, does not teach all features of claim 24 or render claim 24 obvious.

Applicants respectfully request withdrawal of the rejection.

Other claims in consideration are each dependent on the independent claims 1, 24, and 38, and believed to be patentable for the same reasons. Since each dependent claims is also deemed to define other aspects of the invention, individual consideration of the patentability of each on its own merit is respectfully requested.

Should the Examiner deem that there is any issue which may be best resolved by telephone, the Examiner is respectfully requested to contact the representative undersigned below. Please charge any additional fees or credit any overpayments to deposit account No. 50-0896.

Respectfully submitted,
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